Innovation States
1996-2000

TARGET MISSOURI

TM-1201-1
December 2001

MISSOURI DEPARTMENT OF ECONOMIC DEVELOPMENT

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Key Findings

In the United States between 1996 and 2000, 27.40 patents were issued per 100,000 population. Areas with the highest number of patents issued per 100,000 population were in Idaho, New England, Minnesota and California. Areas with the lowest number of patents per 100,000 were located in the South and the Great Plains. Missouri ranked well below the national average, with 14.81 patents issued per 100,000 population.

Areas with well above average innovation scores were in Idaho, New England, Minnesota and California. In addition, Colorado had an above average innovation score. Areas with well below average innovation scores were located in the South, the upper Great Plains, Alaska and Hawaii. Missouri had a below average innovation score, meaning that it ranked below the national average in patents issued per 100,000.

Between 1996 and 2000, an average of 808 patents were issued in Missouri, accounting for only 1.09% of all patents issued nationally. A large number of patents were issued in the life sciences - one of Missouri's targeted industries. The technologies patented include innovations in drug and biological compositions, organic compounds, molecular biology and microbiology.

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Analysis and reporting by David J. Peters.

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I. Overview

Innovation is generally considered one of the key components of success in the New Economy. Innovations occurring within an economy usually lead to increased economic output, the creation of more jobs with higher wages, increased investment and increased research and development dollars. Innovation also increases the attractiveness of an area for recruiting new businesses and highly skilled workers.

The notion of firms locating to areas where they can share resources with other similar firms is termed industry clustering, and has been studied extensively by regional economists. These resources are shared products, services and knowledge provided by other industries and institutions. The theory behind industry clusters is that each firm's competitive position in the market depends on one or several supporting industries or institutions. This interdependence between a firm's suppliers and consumers is key to the success of a given industry. Industry cluster analysis views the development of supporting industries as vital to the health and growth of a given industry. Industries can be clustered along labor, knowledge, or inter-industry transactions. Therefore, it is argued that firms and workers generally locate to areas that are innovation centers for a given industry.

To measure the degree of innovation within a state, utility patent data was compiled and analyzed. Data is taken from the Technology Assessment and Forecast (TAF) database, maintained by the United States Patent and Trademark Office of the U.S. Department of Commerce. For this analysis, utility patents (patents for inventions) granted between 1996 and 2000 were extracted from the TAF database. TAF also classifies patents according to the major divisions of technology in the U.S. Patent Classification System (USPCS). The USPCS currently contains approximately 460 total classes of technology. Patents are classified by technology class and geographic location according to information given in the patent application. Technology classes are assigned to the primary technological application of the innovation. Geographic locations were assigned as the physical location of the individual or organization who is the primary patent holder.

Two measures of innovation were used in this analysis:

(1) *Number of Patents Issued Per 100,000 Population*. This measure removes the effect of population size, and allows for state-to-state comparisons.

(2) *Innovation Scale*. To compare the number of patents issued per 100,000 population to the national average, the standardized z-scores were calculated for each state. Scores of 0.0 indicate innovation at the national average. Scores greater than 1.0 indicate innovation above the national average. Scores less than 1.0 indicate innovation below the national average.

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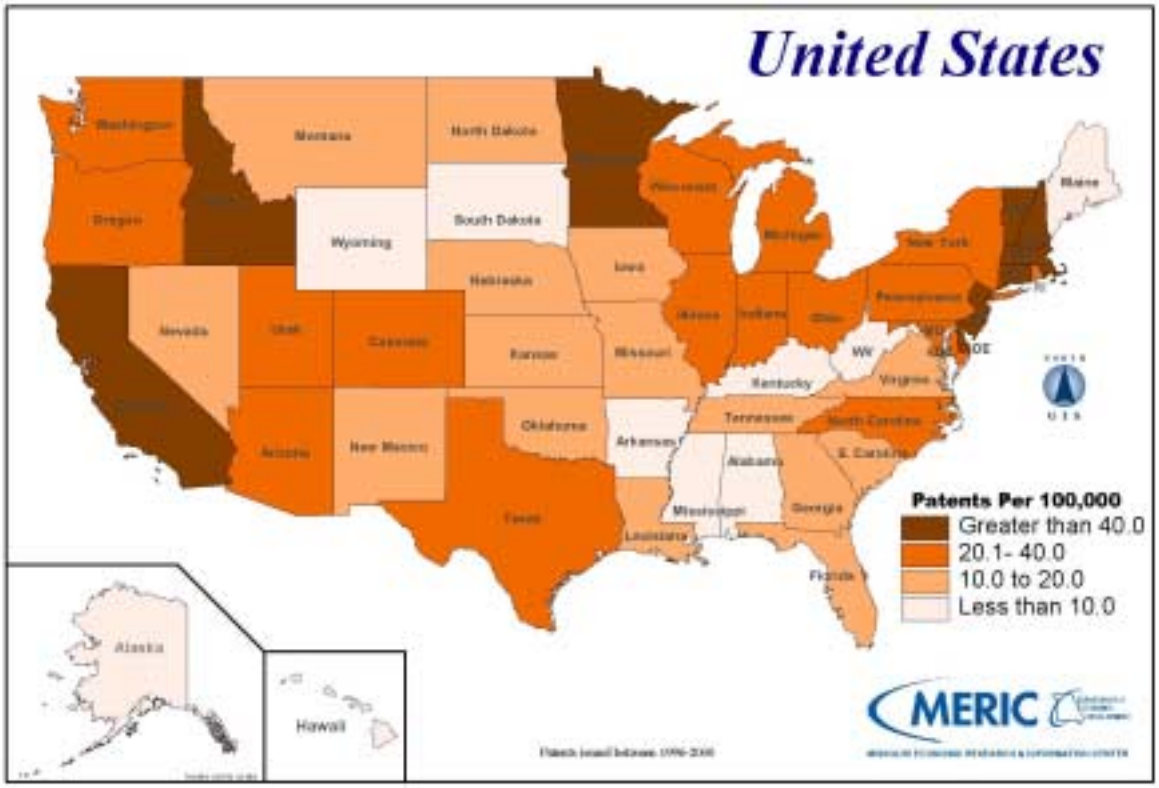
II. National Comparisons

In the United States between 1996 and 2000, 27.40 patents were issued per 100,000 population. States with the highest number of patents issued per 100,000 population were Idaho (74.14), Delaware (53.88), Vermont (52.93), Connecticut (50.15), Massachusetts (49.97), Minnesota (48.15), New Hampshire (46.43), New Jersey (44.02) and California (43.87). States with the lowest number of patents per 100,000 were located in the South and the Great Plains.

Missouri ranked well below the national average, with 14.81 patents issued per 100,000 population. Between 1996 and 2000, an average of 808 patents were issued in Missouri. Although patents grew by 25.30% between 1996 and 2000, this growth rate was below the national growth rate of 39.24%.

Map 2.1
Average Annual Number of Patents Issued Per 100,000 Population, 1996-2000
Average values for years 1996-2000
U.S. average = 27.4 patents per 100,000 population



Source: U.S. Patent and Trademark Office, U.S. Department of Commerce

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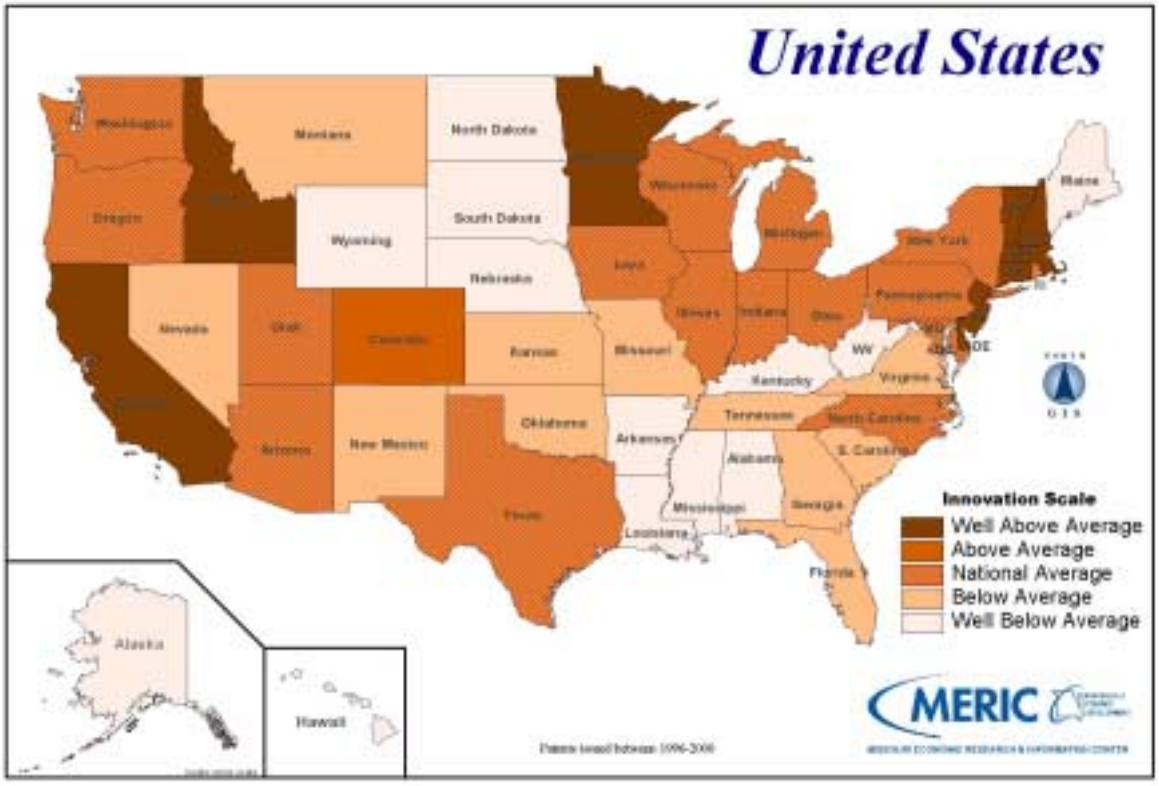
The innovation scale was created by calculating the standardized z-scores for the number of patents issued per 100,000 population. This allows for state-by-state comparison relative to the national average. Scores of 0.0 indicate innovation at the national average. Scores greater than 1.0 indicate innovation above the national average. Scores less than 1.0 indicate innovation below the national average.

States with well above average innovation scores were Idaho (2.96), Delaware (1.68), Vermont (1.62), Connecticut (1.44), Massachusetts (1.43), Minnesota (1.31), New Hampshire (1.21), New Jersey (1.05) and California (1.04). In addition, Colorado had an above average innovation score (0.73). States with well below average innovation scores were located in the South, the upper Great Plains, Alaska and Hawaii.

Missouri had a below average innovation score (-0.80), meaning that it ranked below the national average in patents issued per 100,000.

Map 2.2
Innovation Scale, 1996-2000
Average values for years 1996-2000
Normed to the U.S. average of 27.4 patents per 100,000 population



Source: U.S. Patent and Trademark Office, U.S. Department of Commerce

Table 2.1
Average Annual Number of Innovations by State, 1996-2000
Average values for years 1996-2000

STATE	INNOVATION SCALE	PATENTS PER 100,000	PATENTS ISSUED	POPULATION BASE	GROWTH 1996-2000
IDAHO	2.96	74.14	916	1,234,984	330.14%
DELAWARE	1.68	53.88	403	748,664	-13.00%
VERMONT	1.62	52.93	314	593,633	48.82%
CONNECTICUT	1.44	50.15	1,654	3,299,141	25.84%
MASSACHUSETTS	1.43	49.97	3,085	6,173,908	41.23%
MINNESOTA	1.31	48.15	2,288	4,751,369	53.36%
NEW HAMPSHIRE	1.21	46.43	553	1,191,350	49.05%
NEW JERSEY	1.05	44.02	3,584	8,143,421	25.78%
CALIFORNIA	1.04	43.87	14,364	32,739,620	67.02%
COLORADO	0.73	39.00	1,562	4,006,074	57.05%
MICHIGAN	0.45	34.45	3,386	9,829,417	17.14%
NEW YORK	0.23	31.11	5,700	18,323,844	17.55%
OREGON	0.20	30.62	1,008	3,291,590	54.53%
UTAH	0.19	30.37	641	2,110,243	30.93%
ILLINOIS	0.09	28.80	3,489	12,116,390	21.91%
WISCONSIN	0.09	28.79	1,509	5,242,062	27.55%
ARIZONA	0.07	28.51	1,343	4,712,151	50.19%
WASHINGTON	0.03	27.81	1,583	5,690,476	59.46%
PENNSYLVANIA	-0.02	27.15	3,275	12,066,259	24.44%
OHIO	-0.03	26.95	3,032	11,249,415	22.21%
RHODE ISLAND	-0.03	26.89	269	1,000,333	36.17%
TEXAS	-0.06	26.53	5,252	19,794,003	51.59%
MARYLAND	-0.12	25.56	1,316	5,149,650	23.07%
INDIANA	-0.30	22.71	1,346	5,927,656	11.82%
NORTH CAROLINA	-0.46	20.13	1,529	7,596,452	55.39%
IOWA	-0.50	19.56	562	2,871,926	36.34%
NEW MEXICO	-0.65	17.10	298	1,744,303	43.56%
FLORIDA	-0.71	16.13	2,422	15,022,423	25.02%
GEORGIA	-0.77	15.24	1,171	7,685,907	35.88%
MISSOURI	-0.80	14.81	808	5,455,222	25.30%
OKLAHOMA	-0.82	14.46	485	3,350,414	12.68%
VIRGINIA	-0.82	14.39	983	6,827,804	33.06%
NEVADA	-0.83	14.27	252	1,764,668	63.08%
TENNESSEE	-0.88	13.54	739	5,459,501	23.38%
SOUTH CAROLINA	-0.89	13.29	512	3,853,273	13.22%
KANSAS	-0.91	13.06	345	2,639,148	34.36%
MONTANA	-0.92	12.85	114	883,974	3.64%
NEBRASKA	-1.01	11.46	191	1,668,352	37.72%
DIST OF COLUMBIA	-1.07	10.56	57	535,902	55.00%
LOUISIANA	-1.08	10.34	453	4,378,784	29.50%
NORTH DAKOTA	-1.10	10.04	64	639,495	37.10%
WYOMING	-1.12	9.78	47	482,709	66.67%
KENTUCKY	-1.14	9.48	374	3,945,154	43.57%
MAINE	-1.17	8.96	112	1,252,434	29.59%
WEST VIRGINIA	-1.22	8.20	149	1,812,306	26.32%
SOUTH DAKOTA	-1.24	7.91	58	736,064	100.00%
ALASKA	-1.24	7.90	49	615,080	22.22%
ALABAMA	-1.25	7.74	337	4,355,737	21.22%
HAWAII	-1.31	6.73	80	1,192,252	-3.75%
ARKANSAS	-1.35	6.15	157	2,558,368	88.60%
MISSISSIPPI	-1.35	6.07	168	2,761,273	32.85%
UNITED STATES	**0.00**	**27.40**	**74,388**	**271,474,580**	**39.24%**

Source: U.S. Patent and Trademark Office, U.S. Department of Commerce

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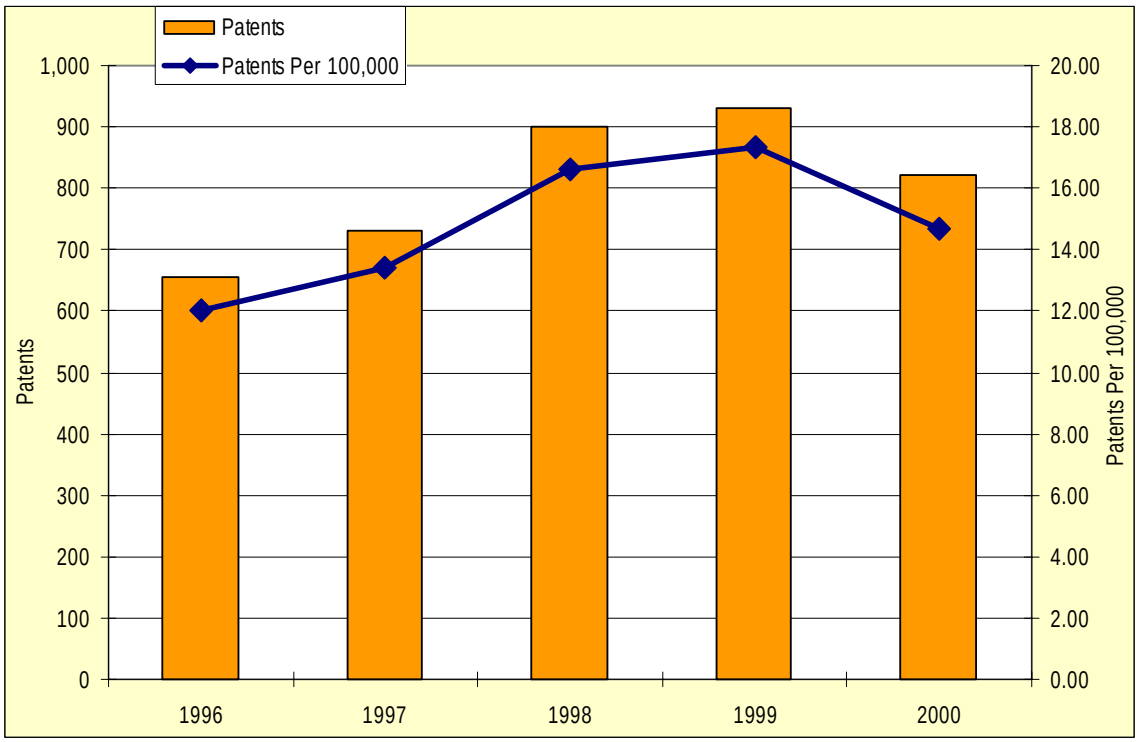
III. Missouri Innovations

Between 1996 and 2000, an average of 808 patents were issued in Missouri, accounting for only 1.09% of all patents issued nationally. The number of patents issued in Missouri peaked in 1999 at 931, yet fell in 2000 to 822 patents issued. Patents per 100,000 population also peaked in 1999 at 17.34, and also fell in 2000 to 14.69 patents issued per 100,000 population.

Between 1996 and 2000, there were 4,040 patents issued in Missouri over this five year period, accounting for only 1.09% of the total number of patents issued nationally over five years.

Chart 3.1
Number of Innovations in Missouri, 1996-2000



Source: U.S. Patent and Trademark Office, U.S. Department of Commerce

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A large number of patents were issued in the life sciences - one of Missouri's targeted industries. There were an average of 72 drug and biological composition patents that were issued annually in Missouri between 1996 and 2000, accounting for 1.98% of all patents of this type issued nationally. There were an average of 33 organic compound patents that were issued annually in Missouri between 1996 and 2000, accounting for 2.28% of all patents of this type issued nationally. Lastly, there were an average of 26 molecular biology and microbiology patents that were issued annually in Missouri between 1996 and 2000, accounting for 1.19% of all patents of this type issued nationally.

In addition, Missouri had a large national share of annual patents issued in several technology classes: concentrating evaporators (1 patent annually accounting for 14.29% of patents nationally), binder devices (3 patents annually accounting for 11.03% of patents nationally), coin handling (1 patent annually accounting for 10.00% of patents nationally), electrothermally actuated switches (3 patents annually accounting for 9.55% of patents nationally) and fluid current conveyors (3 patents annually accounting for 9.29% of patents nationally).

Table 3.1
Average Annual Number of Innovations by Classification, 1996-2000
Average values for years 1996-2000

CLASSIFICATION	MISSOURI PATENTS	UNITED STATES PATENTS	PERCENT OF U.S. PATENTS
Drug & Biological Compositions	72	3,649	1.98%
Organic Compounds	33	1,455	2.28%
Molecular Biology & Microbiology	26	2,223	1.19%
Surgery	18	1,397	1.26%
Dispensing - Apparatus & Process	15	360	4.06%
Electrical Generator or Motor Structure	14	258	5.50%
Stock Material or Miscellaneous Articles	13	1,295	1.03%
Surgery - Instruments	13	1,102	1.16%
Multicellular Living Organisms	11	318	3.45%
Fluid Handling	9	447	2.06%
Static Structures - Buildings	9	644	1.43%
Liquid Purification or Separation	9	701	1.31%
Communications: Electrical	9	773	1.19%
Beds	9	237	3.80%
Synthetic Resins or Natural Rubbers	9	1,533	0.59%
Special Receptacle or Package	9	529	1.66%
Fluid Sprinkling, Spraying, & Diffusing	9	294	2.93%
Plant Protecting & Regulating Compositions	8	103	7.96%
Surgery - Medicators & Receptors	8	948	0.84%
Metal Working	8	629	1.21%
Supports for Holding Articles	7	462	1.60%
Measuring & Testing	7	817	0.91%
Adhesive Bonding & Misc Chemical Manufacture	7	566	1.20%
Aeronautics	7	235	2.81%
Food or Edible Material: Processes & Products	7	434	1.52%
TOTAL	**808**	**74,388**	**1.09%**

Source: U.S. Patent and Trademark Office, U.S. Department of Commerce

VI. Implications and Summary

Innovation is generally considered one of the key components of success in the New Economy. Innovations occurring within an economy usually lead to increased economic output, the creation of more jobs with higher wages, increased investment and increased research and development dollars. Innovation also increases the attractiveness of an area for recruiting new businesses and highly skilled workers.

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One of Missouri's main efforts in the coming years should be to assist firms and institutions in developing more innovations for patenting. Missouri's low innovation score may hinder development of the state's targeted industries - advanced manufacturing, information technology and life sciences. On a positive note, however, most of the patents issued in Missouri during the last five years were in life sciences - indicating an emerging industry that is small yet innovative.

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